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We hope that this very troubled process, we are experiencing due to the coronavirus pandemic, is over as soon as possible by using the scientific methods not by praying, if it is natural. We wish most of us to return to our happy and healthy days again. The authors

http://zoobank.org/References/651C1F5C-6ED2-4B10-9CFF-A9AE79CCCFAB

On the occurence of *Catarhoe semnana* and *permixtaria* in South East Turkey (Lepidoptera, Geometridae)

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Abstract: On the occurence of *Catarhoe semnana* and *permixtaria* in South East Turkey (Lepidoptera, Geometridae). *Misc. Pap*. 208: 1-8, 22 figs. 1 map.
In this paper, occurence of two species of *Catarhoe* in Turkey is discussed. *Catarhoe semnana* is reported here from Hakkari, Van, Bitlis and Ağrı provinces for the first time. *Catarhoe permixtaria* is also reported here from İçel province for the first time. Male and female genitalia of *Catarhoe semnana* and *C. permixtaria* also their tympanal organs are illustrated. Images of adults from collection and nature are given. A distributional map for both species is added.

Key words: *Catarhoe permixtaria, semnana,* Larentiinae, Geometridae, Lepidoptera, fauna, Turkey, genitalia, tympanal organs.

The species *permixtaria* was illustrated by Herrich-Schäffer in 1851 uninominally; therefore nomenclaturally unavailable. For that reason, it can not be used as a valid name of a taxon. In 1856, in the index of Herrich-Schäffer's book, the name *permixtaria* was used with the name "*Larentia*". This act made *permixtaria* available according to the rules of ICZN. Of course, this is not advisable case, and it is not expected to become universal. The species was re-described by Guenée in 1858 (Spéc. Gen. lépid. 10 (2): 404) with the name combination "*Melanippe permixtaria*" from "Beyrouth" (Lebanon) based on 1♂1♀ in the coll. Lederer. Whereas, the type locality in the original description of Herrich-Schäffer's name is unknown. *Catarhoe permixtaria* is currently distributed from Balkans to Turkey and East Mediterranean countries.

The species *semnana* was described by Wiltshire (1970) as "*Catarhoe semnana*" from North Iran. Hausmann & Viidalepp (2012: 131) reported *semnana* as a sister species of *Catarhoe permixtaria* from the eastern Turkey, Transcaucasus and northern Iran.

Before preparing this paper, the status of all the species of *Catarhoe*, occuring in the Middle East have been discussed by us from the taxonomical, genetical and faunistical standpoints. No paper has been published on the *Catarhoe* species of Turkey until now. This genus has not been mentioned previously in the barcoding project of the Cesa (Kemal *et al.,* 2020a: 156-157). Within the Cesa Project DBLCC[2], the genetic data of some *Catarhoe* species in Turkey will be evaluated,

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[2] https://www.researchgate.net/project/DNA-Barcoding-of-the-Lepidoptera-of-Cesa-Collection-DBLCC

whenever the results obtained.[3] For the time being, the faunistic results, the genitalia and the tympanals are given here. The tympanals of both sexes in *semnana* and of female in *permixtaria* are illustrated for the first time. The specimens of *permixtaria* and *semnana* in the Cesa collection and also the images in the Cesa Archive, photographed during field studies are evaluated.

The specimens from Bitlis, Van and Hakkari Provinces, identified as *Catarhoe permixtaria*, previously published or not published, are revised. Necessary genitalic preparations are made and illustrated here. On the other hand, the *Catarhoe* specimen from Anamur (İçel Province, South Turkey) (Kemal *et al.,* 2020b) shows typical morphological characters of *permixtaria*. This record is also new for the fauna of the İçel Province.

Catarhoe semnana Wiltshire,1970 (Figs. 1-3, 5-7, 9-12, 15-22, Map 1)

Synonymy: *semnana* Wiltshire,1970

Original Reference: *Catarhoe semnana* Wiltshire,1970, Annln. naturh. Mus. Wien 74: 378-379, figs. Holotype ♂: Iran, Derbend 25km N v. Teheran 2000m, Kasy & Vartian leg.

Range (as code)[4]: **TR IR Elb Th Se 04 13 30 65 04C 04Cf 13F 13F71 30B 30Bç 30Bt1 30Bz 65A 65Ac3 65Ai 65Am 65Am4 65An 65Aş 65At5 65D 65Df 65Dg 65G 65Gb 65Gf 65F 65Fz 65L 65Le 65K 65Kl 65Kd 65Z**

Selected faunistic records in Turkey:
Catarhoe permixtaria: Kemal & Koçak, 2012, Cesa News 72: fig.23 Dez valley (Hakkari Prov.).
Catarhoe permixtaria: Kemal & Koçak,2016, Priamus 14 (2): 78 Bahçesaray.
Catarhoe permixtaria (pro parte): Kemal & Koçak, 2017a, Priamus 15 (1): 6 Çatak, Saklıvadi.
Catarhoe permixtaria: Kemal & Koçak, 2017b, Cesa News 149: 4. Erek Mountain.
Catarhoe permixtaria: Kemal & Koçak, 2018a. Priamus 16 (4): 155. Zap Valley (Hakkari Prov.).
Catarhoe permixtaria: Kemal & Koçak, 2018b, Priamus 17(1): 71 Van Prov.
Catarhoe permixtaria: Kemal, Koçak & Uçak, 2018a, Priamus 16 (2): 47 Edremit Elmalık (Van Prov.).
Catarhoe permixtaria: Kemal, Koçak & Uçak, 2018b, Cesa News 159: 5 Dağlıca (Hakkari Prov.).

Material studied (134 ex.): 1♀. E Turkey, Van Prov., Gevaş 5km N 1815m (65Fz) 12.vii.2007, H.Ö. & L.K leg. - 1♂. Van Prov., Bahçesaray Vasting 1660m (65An), 4.vi.2016, M. Kemal & A.Koçak leg. - 7♂. Van Prov., Bahçesaray Upper Mukus valley 1840m (65Am4), 23.vi.2016, M. Kemal & A.Koçak leg. - 8♂. Van Prov., Çatak Darboğaz 2030m (65Dg), 30.vi.2016, M. Kemal & A.Koçak leg. - 35♂♀. Van Prov., Bahçesaray Altındere 1935m (65At5), 4.vii.2016, M. Kemal & A.Koçak leg. - 3♂♀. Van Prov., Bahçesaray Paşaköy 1600m (65Ai), 5.vii.2016, M. Kemal & A.Koçak leg. - 13♂. Van Prov., Bahçesaray Upper Mukus valley 1780m (65Am1), 6.vii.2016, M. Kemal & A.Koçak leg. - 9♂. Van Prov., Gürpınar, Kuşdağı 3.4km SE 2005m (65Gf), 20.vi.2017, M. Kemal & A.Koçak leg. - 21♂♀. Van Prov., Çatak Saklıvadi 2030m (65Df), 25.vi.2017, M. Kemal & A.Koçak leg. - 4♂. from same place, 14.vii.2017, M. Kemal & A.Koçak leg. - 2♂1♀. Van Prov., Edremit Elmalık 1750m (65Le), 28.vi.2017, M. Kemal & A.Koçak leg. - 1♂. Van Prov., Bahçesaray Bağcılar 1km SE 2210m (65Aş), 15.vii.2017, M. Kemal & A.Koçak leg. - 1♂. Van Prov., Bahçesaray Liman Populetum 2320m (65Ac3), 16.vii.2017, M. Kemal & A.Koçak leg. - 6♂ 2♀. Bitlis Prov., Mutki Aydemir 1710m (13F71), 11.vi.2018, M. Kemal & A.Koçak leg. - 8♂♀ (GP3246♂). Hakkari Prov., Ağaçdibi 1220-1375m (30Bç), 15-16.vi.2018, M. Kemal & A.Koçak leg. - 1♂. From same place, 7.vii.2018, M. Kemal & A.Koçak leg. – 2♂. Hakkari Prov., Zap valley, Sulphur valley 1570m (30Bt1), 18.vi.2018, M. Kemal & A.Koçak leg. – 4♂. Ağrı Prov., Doğubeyazıt vic. İhsakpaşa sarayı 1940m (04Cf), 27.vi.2019, M. Kemal & A.Koçak leg. – 4♂. Van Prov., Gürpınar Zernek 1970m (65Gb), 5.vii.2019, M. Kemal & A.Koçak leg. (Cesa).

Remarks: *Catarhoe semnana* is closely related to *C. permixtaria*, but a distinct species morphologically. Externally, both sexes are easily distinguishable from *permixtaria* by the large whitish apical area on the fore-wing. The genitalia are also different enough. Most of the previously reported names by us as "*Catarhoe permixtaria*" are now replaced by *semnana*. However, a few *permixtaria* records remain unchanged. *Catarhoe semnana* is widely distributed and common in the following provinces, Hakkari, Van, Bitlis and Ağrı in East Turkey **(Map 1)**. This species inhabits relatively dry, mountain steppe in SE Turkey. Among various habitats, *semnana* is remarkably commoner at Altındere (Van Prov., Bahçesaray), which is illustrated here **(Fig. 1)**.

Flight time: June-July.

[3] Due to the pandemic coronavirus, all vital and scientific activities were disrupted in the world.
[4] For the explanations of the code, use the updated list of the authors (Koçak & Kemal, 2019).

***Catarhoe permixtaria* (Herrich-Schäffer,[1856]) (Figs. 4, 8, 13, 14, Map 1)**

Synonymy: #*permixtaria* Herrich-Schäffer,[1851]; *permixtaria* Herrich-Schäffer,[1856] [nec bene]

Original Reference: *Larentia permixtaria* Herrich-Schäffer,[1856], Syst. Bearb. Schmett. Europa. Index 16. Type material and locality are not given.

Range (as code): **RO MK BG GR TR LB Bei CY AZ Nv Cc Kir Ord Tbl GG AM IR Gls TM? Kp? IL Pa Car Js JO 05 13 16 23 31 33 46 56 65 71 05A 13F 13F22 13F71 13G 13Gg 16A 23M 31M 33A 33Ac 42B 56F 65D 65Df 65G 65Gf 65Gy 65N? 65Nm?**

Faunistic records in Turkey:
Catarhoe sp.: Kemal *et al*., 2020b, Priamus 19 (1): 7 Anamur: Taşocağı.

Material studied (6 ex.): 1♂1♀. E Turkey, Van Prov., Gürpınar, Kuşdağı 3.4km SE 2005m (65Gf), 20.vi.2017, M. Kemal & A.Koçak leg. - 1♂. Van Prov., Çatak, Saklıvadi 2030m (65Df), 25.vi.2017, M. Kemal & A.Koçak leg. - 1♂. SE Turkey, Bitlis Prov., Mutki Aydemir 1710m (13F71), 11.vi.2018, M. Kemal & A.Koçak leg. - 1♀. Mutki, Kavakbaşı *Quercetum* 1670m (13F22), diurnal, 9.viii.2018, M. Kemal & A.Koçak leg. - 1♀ (GP3251). S Turkey, İçel Prov., Anamur Taşocağı 210m (33Ac), 4.vi.2019, M. Kemal & A.Koçak leg. (Cesa).

Remarks: The nominate subspecies may occur in East Mediterranean Region. Probably the populations of East Turkey may belong to the nominate subspecies genetically. To the eastwards, the species is distributed to northeastern Iran, which may be represented by a distinct subspecies of *permixtaria* (the genetic distance 1.4%). In East Turkey, this species inhabits at the places similar to the habitats of *semnana*, but the frequency of the adult is very rare.

Flight time: June-early August.

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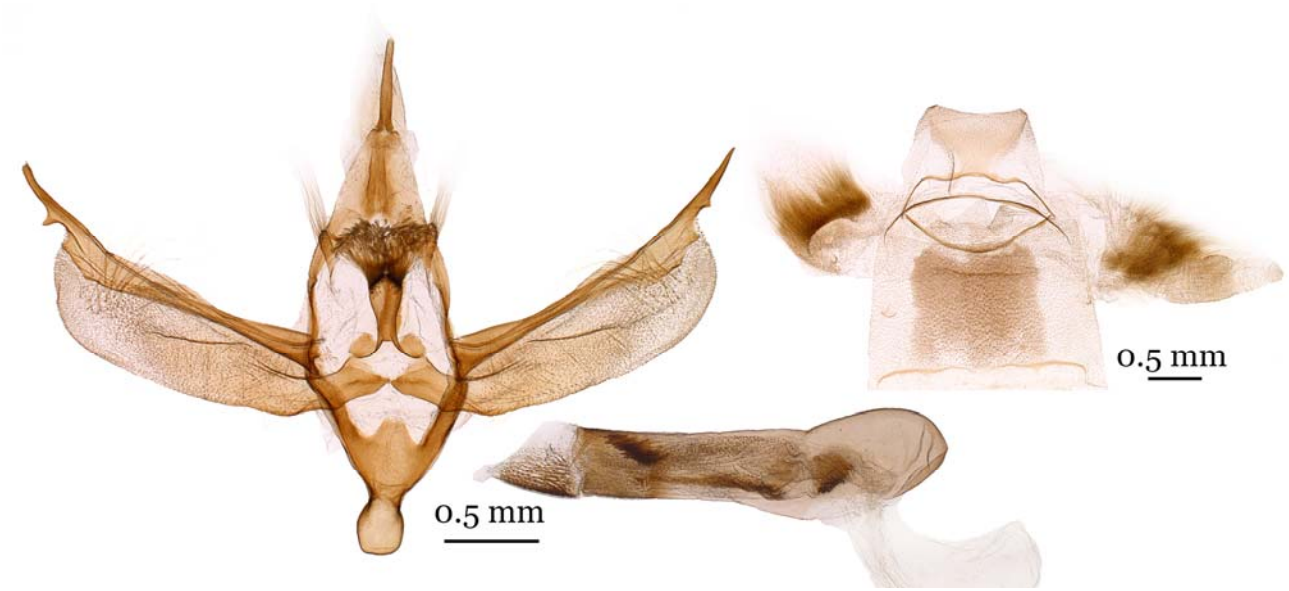
Habitat of *Catarhoe semnana* in South East Turkey

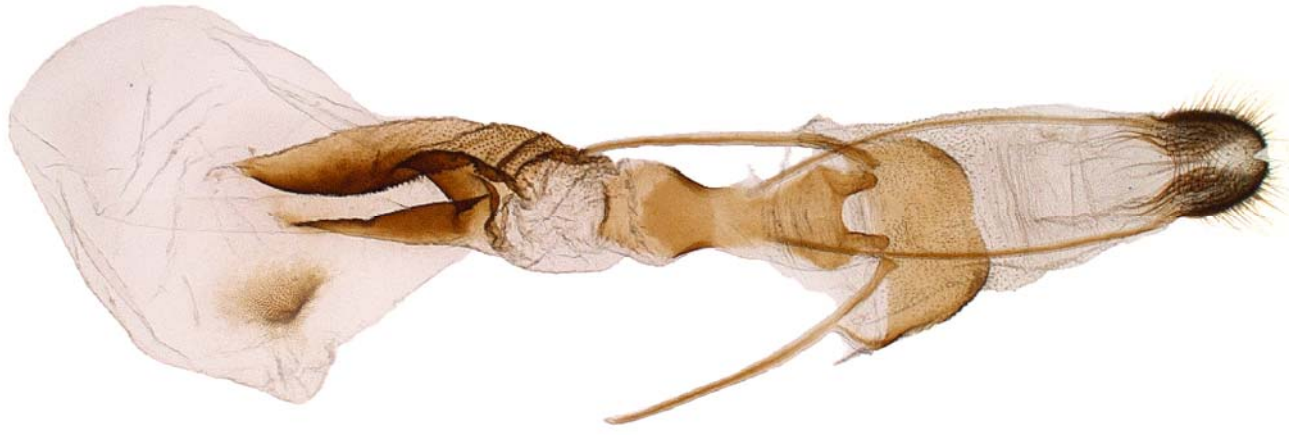
Fig. 1 - One of the habitats of *Catarhoe semnana*. Van Prov., Bahçesaray, Altındere NW 1935m. Dry, rocky places. M. Kemal (Cesa)

Figs. 2-4 - Dissected *Catarhoe* specimens. *Catarhoe semnana*: male GP3246 (left), female (GP3253) middle. *Catarhoe permixtaria*: female (GP3251) (right). M. Kemal (Cesa).

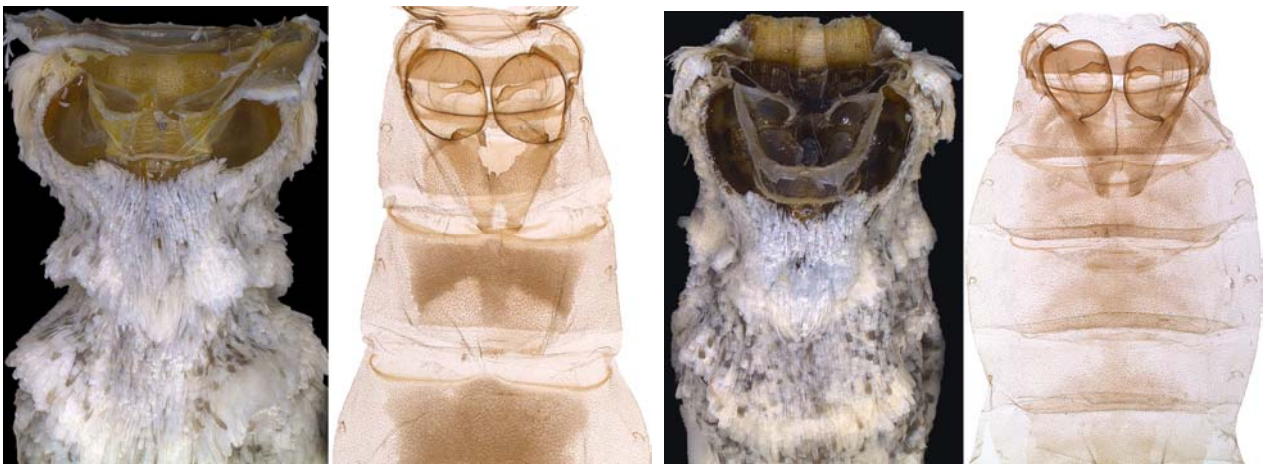


Figs. 5, 6 – *Catarhoe semnana*. Male genitalia and abdominal scent organ (GP3246). Hakkari Prov. Ağaçdibi 1375m. M.Kemal (Cesa).

Figs. 7 - *Catarhoe semnana*. Female genitalia (GP3253). SE Turkey, Hakkari Prov., Ağaçdibi. M. Kemal (Cesa).



Figs. 8 – *Catarhoe permixtaria*. Female genitalia (GP3251). S Turkey, İçel Prov. Anamur. M.Kemal (Cesa).



Figs. 9-12 - *Catarhoe semnana*. Tympanal organs. Hakkari Prov., Ağaçdibi. Male (left), female (right). M. Kemal (Cesa)

Figs. 13, 14 - *Catarhoe permixtaria* (female). Tympanal organ. İçel Prov., Anamur. M. Kemal (Cesa)

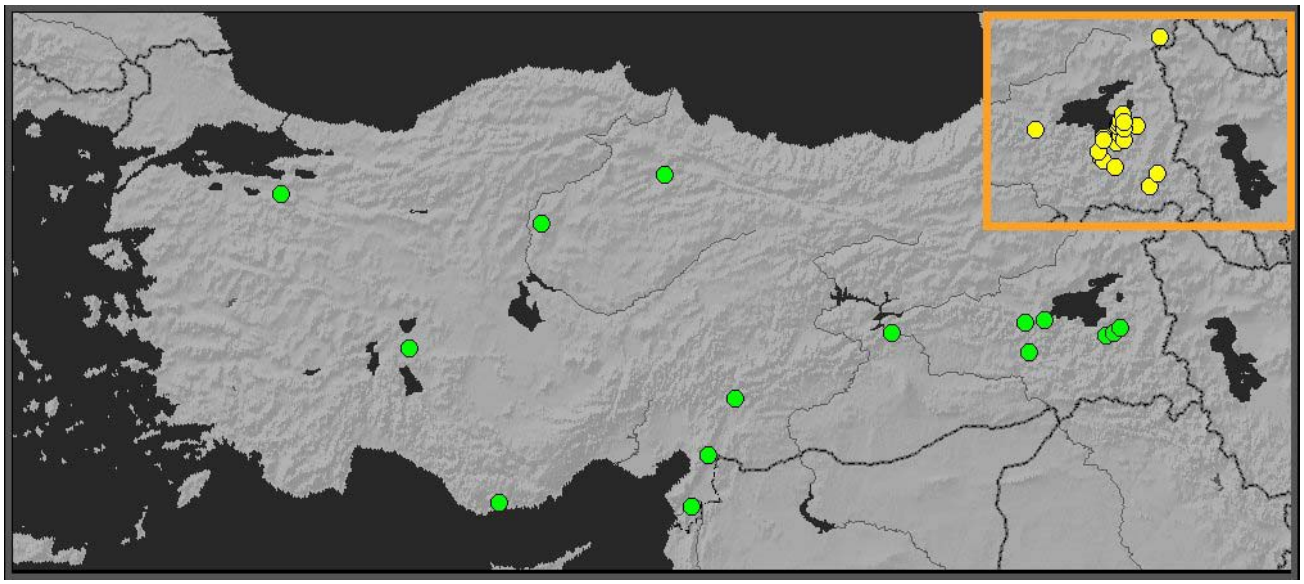
Selected images of *Catarhoe semnana* from nature

Figs. 15, 16 – Van Prov., Çatak, Darboğaz 1970m (65Dg), 30.vi.2016 (left). Van Prov., Bahçesaray, Altındere NW 1935m (65At5), 5.vii.2016 (right), M. Kemal (Cesa).

Figs. 17, 18 – Van Prov., Bahçesaray, Altındere NW 1935m (65At5), 5.vii.2016 (both), M. Kemal (Cesa).

Figs. 19, 20 – Van Prov., Gürpınar, Çatdağı 2280m (65Gg), 20.vi.2017 (left). Hakkari Prov., Zap Valley, Sulphur valley 1620m (30Bt1), 18. vi.2018 (right), M. Kemal (Cesa).

Figs. 21, 22 – Van Prov., Kurubaş Pass 2250m (65Kd) 12.vii.2013 (left). Ağrı Prov., Doğubeyazıt 1940m (04Cf) 28.vi.2019 (right), M. Kemal (Cesa).



Map 1 – *Catarhoe permixtaria* (green), *Catarhoe semnana* (yellow). The latter is confined to eastern region in Turkey. In the mountainous region of southern Van Lake, both species are found together at some places.

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